

Remarks

Claims 1-20 were pending; among which claims 16-20 were withdrawn. Please cancel Claim 11. Please amend Claims 1-4 and 9-10 and withdrawn claims 16-20 as shown. New claims 21 and 22 have been added. No new matter has been added and support is found, for example, on pages 2-3 of the specification as filed. Claims 1-22 now are pending, among which claims 16-20 stand withdrawn. Entry of the enclosed amendment and reconsideration of the application respectfully are requested.

§ 112 Rejections

Claims 1-15 stand rejected under 35 USC § 112, second paragraph, as purportedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Claim 1 has been amended to remove the term, “sufficiently dense” and to include “heating the resulting mixture until a composition of $\text{Li}_y[\text{Ni}_x\text{Co}_{1-2x}\text{Mn}_x]\text{O}_2$ having a pellet density of at least 3.3 g/cm^2 is obtained for use in a lithium-ion battery.” Pellet density is defined in the specification as filed, for example, on page 7, line 24 to page 8, line 7. As suggested by the Examiner, the term “a resulting mixture” has been added to the second element of claim 1 to provide proper antecedent basis for the rest of the claim. In amended claims 2-4 and 9-10 and 18-20 the word “about” has been removed. Finally, the Applicants traverse the Examiner’s rejection to amended claim 10 as being indefinite arguing that it is unclear how “theoretical” density is determined. The formula for “theoretical density” is described, for example, on page 5, line 4 and is easily calculated by one skilled in the art guided by the present disclosure.

Applicants submit that the rejection of claims 1-15 under 35 USC § 112, second paragraph, is unwarranted in part and has been overcome in part, and that the rejection should be withdrawn.

§ 102 Rejections

Claims 1-3, 5-11, 14 and 15 stand rejected under 35 USC § 102(b) as purportedly being anticipated by JP 2002-304993 (Shiozaki). The Examiner pointed to a specific compound, $\text{LiMn}_{0.35}\text{Ni}_{0.42}\text{Co}_{0.23}\text{O}_2$, in Table 1.

Applicants' amended claim 1 is directed to a method of producing $\text{Li}_y[\text{Ni}_x\text{Co}_{1-2x}\text{Mn}_x]\text{O}_2$. This requires the same molar amount of Ni as Mn. $\text{LiMn}_{0.35}\text{Ni}_{0.42}\text{Co}_{0.23}\text{O}_2$ has quite different molar amounts of Ni and Mn. Thus, Shiozaki has not been shown to describe all of the elements of Applicant's amended claim 1. Additionally, the Examiner has pointed out that "a transition mixed metal hydroxide may be used as a raw material or a precursor" and cites Shiozaka paragraph [0021]. Paragraph [0021] deals with balancing the oxidation number of the metallic elements in the metallic oxides. In fact, paragraph [0023] states that "the value of a, b, and c can be set ... by defining the mixing ratio of each transition metal compound contained in the mixture before heat treatment." This suggests that three different transition metal compounds were mixed before heat treatment. In contrast, Applicants' invention requires mixing the combination metal oxide, $\text{Li}_y[\text{Ni}_x\text{Co}_{1-2x}\text{Mn}_x]\text{O}_2$, with LiOH or Li_2CO_3 .

Additionally, Applicants' amended claim 1 comprises "mixing a boron compound ... wherein the total amount of boron compounds is greater than 0.1% of the total weight of the mixture." Shiozaki indicates in paragraph [0025] that "the amount of the boron compound included in said mixture is made into 0.001 to 0.1 times by the element ratio to the amount of (a+b+c) of a transition-metals element..." for sintering effectiveness and cell performance.

Claim 11 has been cancelled. Claims 2-3, 5-11, 14 and 15 all depend upon claim 1, as amended. The rejection of claims 1-3, 5-10, 14 and 15 under 35 USC § 102(b) as being purportedly being anticipated by Shiozaki has been overcome and should be withdrawn.

Claims 1-4 and 9-13 stand rejected under 35 USC § 102(e) as purportedly being anticipated by US 7,205,072 B2 (Kang). Applicants have amended claim 1 to change the range of x, which corresponds to the α and β of Kang et al. In Kang, α and β (the molar coefficients for Mn and Ni) can range from 0.2 to 0.6 and γ (the molar coefficient for Co corresponding to (1-2x) of Applicants' claim 1) can range from 0 to 0.3. Applicant's amended claim 1 requires that the coefficients for Mn

and Ni to be the same (x) and the coefficient for Co to be (1-2x). At values of x below 0.35 as required by amended claim 1, (1-2x) is greater than 0.3, excluding Kang.

Additionally, Kang's electrode compositions appear to require Fluorine, for example, z, the subscript on F, is "between about 0 and 0.2" (see Abstract) or "z is between a value greater than 0 and about 0.5" (see Claim 1). Thus, Kang has not been shown to anticipate materials not including Fluorine as in the present invention. Further, the Patent Office has not shown were Kang describes, teaches, or suggests mixing a boron compound together with $[\text{Ni}_x\text{Co}_{1-2x}\text{Mn}_x]\text{OH}_2$ as required in the present invention. Thus, the Patent Office has not shown all elements of the claimed invention in Kang, and the rejection should be withdrawn.

Claim 11 has been cancelled. Amended claims 2-4 and amended claims 9-10 and original claims 12-13 all depend upon claim 1. Claim 1 is allowable at least for the reasons described above. The rejection of claims 1-4 and 9-10 and 12-13 under 35 USC § 102(e) as purportedly being anticipated by Kang is unwarranted in part, and has been overcome in part, and should be withdrawn.

§ 103 Rejections

Claims 4 and 9-11 stand rejected under 35 USC § 103(a) as being purportedly unpatentable over JP 2002-304993 (Shiozaki). As presented above, Shiozaki has not been shown to describe, teach, or suggest all elements of the claimed invention. Thus, the Patent Office has not met its burden of establishing a *prima facie* case of obviousness and the rejection should be withdrawn. More specifically, the Patent Office has not shown how Shiozaki describes, teaches, or suggests heating for at least 6 hours (claim 4) as admitted in the Office Action, which goes on to conclude that heat treating for up to 5 hours makes obvious or inherently teaches heat treating 20% longer (or 6 hours). This unsupported conclusion contradicts all motivation in the art to reduce sintering times to the minimum feasible for, *inter alia*, economic reasons, and this unsupported conclusion makes no attempt to comply with the minimum legal standards requiring that the Office Action establish that the missing limitation necessarily flows from the reference. The Office Action appears completely silent on the reversible volumetric energy requirement of claim 9, and the pellet density required in claim 10. Claim 11 has been cancelled. Thus, the

Office Action does not provide the minimum showing for a *prima facie* case of obviousness under 35 USC § 103(a) in view of Shiozaki so this rejection of claims 4 and 9-11 should be withdrawn.

Claims 5-11 stand rejected under 35 USC § 103(a) as purportedly being unpatentable over US 7,205,072 B2 (Kang) in view of JP 2002-304993 (Shiozaki).

The Office Action admits that Kang does not describe the amount of sintering agent (see p. 6). The Office Action nevertheless concludes that Kang makes the present invention obvious “because Kang teaches an appropriate amount of lithium fluoride may be added to the mixture” and further that Kang’s Figure 4 teaches varying the amount and suggests at least 2% (see p. 6-7). The Office Action concludes that claims 9 through 11 “are considered inherent in view of the teachings of Kang.” (see p. 7). Other than the opening sentence, the Office Action does not apply the secondary reference in this rejection.

Claim 5 requires, *inter alia*, a boron compound as a sintering agent. The Patent Office has not shown where Kang describes, teaches, or suggests a boron compound sintering agent. It appears that Kang requires LiF to fulfill Kang’s requirement of Fluorine in the Oxygen layer of the Kang cathode composition. (see, e.g., col. 2 lines 45-46, describing fluorine doping on oxygen sites). The Patent Office has not shown that Shiozaki adds any additional descriptions, teachings, or suggestions in combination with Kang that might support a *prima facie* case of obviousness by including all of the limitations of Applicants’ claim 5-11.

The Office Action shows no attempt to show all limitations of the invention of claim 9 (volumetric energy) or claim 10 (pellet density) in the cited references. For this reason alone, the rejection as to these claims should be withdrawn.

Further, since claims 5-10 (11 has been canceled) all depend upon amended claim 1, which is patentable for at least the reasons stated above, dependent claims 5-10 also should be allowed. Thus, the rejection of claims 5-10 under 35 USC § 103(a) as purportedly being unpatentable over Kang in view of Shiozaki is unwarranted in part and has been overcome in part and should be withdrawn.


Rejoinder

Applicants request rejoinder of claims 16-20 that were previously withdrawn as a response to a restriction requirement dated February 22, 2007. Withdrawn claim 16 is directed to a composition produced by the method of amended claim 1. Since amended claim 1 is now in condition for allowance, and claim 16 includes all of the limitations of amended claim 1, Applicants request rejoinder of claim 16. Claim 17 also has been amended to support Applicants request for rejoinder of amended claim 17. Withdrawn claims 18-20 depend from 16 or 17, and Applicants similarly respectfully request rejoinder of claims 18-20.

In view of the above, it is submitted that the application is in condition for allowance. Examination and reconsideration of the application as amended respectfully is requested.

Respectfully submitted,

12-OCT-2017
Date

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